

i.e. neither near a node nor near a loop. About a quarter of the length of the tube, from the lower or upper end, as the case may be, appears to be the most favourable position.

RAYLEIGH

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

AMONG the bequests of the late Mr. Henry Brown, J.P., formerly of Bradford, is a sum of 5,000*l.* to the Yorkshire College, Leeds, for the purpose of founding and maintaining scholarships.

THE New York *Nation* states that Dr. A. S. Packard, jun., has been appointed Professor of Natural History at Brown University. His departure from Salem, Mass., the *Nation* states, following on Prof. Morse's and Prof. Putnam's is a serious loss to that scientific centre, and implies an inadequate endowment of the Peabody Academy of Sciences.

THE first conferment of degrees by the Johns Hopkins University took place on June 13. Four candidates were admitted to the degrees of Ph.D. and M.A.

THE following figures, which have been published quite recently at Algiers, will give an idea of the state of public instruction in that colony. Superior instruction is represented only by a preparatory school of medicine in Algiers. It is contemplated to establish in that city a university of letters, science, law, and medicine; but no step has yet been taken to realise the scheme. There are colleges, or lycées at Algiers, Oran, Constantine, Bone, Philippeville, Blidah, Mostaganem, and one or two other places, and two clerical institutions, one at Blidah, and the other at Algiers. The number of pupils of these establishments is 3,142 in a population of 344,849 of European extraction. Primary instruction is given in 803 schools, frequented by 66,343. A few natives follow the course of instruction in European or secondary schools. Most of them are pupils in the Algiers lycée, which has no less than 980 pupils, and is considered one of the best under the authority of the French government, even in France. Great efforts have been made to organise French-Arab schools for natives, but with not much success. Within the last few years thirteen French-Arab schools have been opened in the Sahara and Kabyle, which have now 1,481 pupils. The aggregate number of young Arabs, receiving education from the French government, is only 1,573 boys, and 173 girls out of a population of 2,500,000. A normal school has been established at Mustapha, near Algiers, and numbers from thirty to forty pupils.

SCIENTIFIC SERIALS

Annalen der Physik und Chemie, No. 4, 1878.—This number commences with a paper by M. Schering on friction currents as exemplified in the rubber of a (cylinder) electrical machine. For production of such currents it is unimportant whether the cylinder be connected to earth or not; and the occurrence of *opposite* electricities at the two ends of the rubber is also not essential. The electricity on the hinder margin of the rubber is derived from the insulator (cylinder); for it agrees in sign with that of the latter, and nearly always disappears when the insulator is connected to earth. The friction causes a less quantity of negative electricity to exist on the hinder margin of the rubber than on the forward margin; the quantity of electricity steadily varies from the hinder to the forward margin.—M. Fröhlich investigates the intensity of diffracted light in relation to that of the incident light. His experimental results closely correspond to those of theory. With small angles the entire incident energy of motion appears again after diffraction as light-motion.—Fresnel's theory of diffraction phenomena is treated at some length by M. Voigt.—Studying certain hydrodynamic problems in relation to the theory of ocean currents, M. Zöppritz concludes, *inter alia*, that the influence of friction has, in one direction, been underrated, in another overrated; the former, because it has not been supposed to extend deep enough, the latter, because in regard to propagation of variable current-motions too much has been ascribed to it. He calculates that with a mean ocean depth of 4,000 m. the trade winds in their present extent and strength would have to blow 100,000 years ere the present state of motion of the equatorial current could be supposed approximately stationary. The damping influence of continents and islands would somewhat diminish the number.—

M. Antolik communicates further observations on the gliding of electric sparks, obtaining new evidence for the fact that a greater tension is required for discharge of positive than for that of negative electricity, and that the one kind passes more rapidly and further than the other.—A formula determining the rotation of the plane of polarisation in quartz for all colours as function of the temperature, is given by M. Sohncke, who also finds that the rotation in chlorate of soda increases with rising temperature in a greater degree than in quartz.—An improved tangent galvanometer for lecture purposes (based on the principle of the Gauss-Weber mirror-magnetometer), a modification of the mercury air-pump, and a method of more accurate measurement of thickness by means of the spherometer, are among the remaining subjects here dealt with.

No. 5.—M. Kohlrausch here describes a "total reflectometer," or instrument by means of which the total reflection in solid bodies is utilised for determination of refraction. (The instrument can also be adapted for liquids.) A liquid is employed which refracts more strongly than the body examined (generally sulphide of carbon). The author gives his numerical results in a table.—A paper on the theory of double refraction, by M. Lommel, furnishes, with two previous papers, the outlines of a new theory of light (he says it might be called the "friction theory"), in which the phenomena in their connection are explained by the reciprocal action of the ether and the particles of bodies.—M. von Waha calls attention to some interesting movements obtained in badly-conducting liquids (as olive oil or petroleum), when placed, *e.g.*, on a horizontal metallic plate, connected electrically with one pole of a Holtz machine, while a point connected with the other pole is held above the liquid.—The phenomena of resonance in hollow spaces are investigated mathematically and experimentally by M. Wand, and an improved anemometer, capable of measuring the mean velocity of air-currents of constant direction between wide limits, forms the subject of a paper by M. Recknagel.

Actes de la Société Helvétique des Sciences Naturelles (C. R. 1876-77) contain an account of the sixtieth meeting of the Society, held at Bex on August 20-22, 1877, together with notes of the sectional meetings, and the following more elaborate memoirs:—On the adaptation of copepod crustaceans to parasitism, by Prof. K. Vogt.—On the fecundation and first development of the ovum, by H. Fol.—On the railway over the Simplon, by Herr Lommel.—Historical account of the mines and salt-works of Bex, by Ch. Grenier.—On the retrogradation of the shadow on the sun dial, by E. Guillemin.—Note on the study of thunderstorms accompanied by hailstorms and electric phenomena, by D. Colladon.—On the geology of the neighbourhood of Bex, by E. Renevier.—On some geological formations in the Bernese Alps, by S. Chavannes.—On the nummulites of the Western Alps, by Ph. de la Harpe.—On the origin and the repartition of the Turbellaria of the deep fauna of the Lake of Geneva, by G. du Plessis.—On the formation of feathers in the gold-hair penguin and *Megapodius*, by Th. Studer.—On the blood corpuscles of *Mermis aquatilis*, Duj., by E. Bugnion.—On a new Amphipode (*Gammarus rhypidophorus*), by Ö. I. Catta.—On the doubtful species in the flora of Switzerland, by L. Leresche.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, June 19.—"On the Reversal of the Lines of Metallic Vapours," by G. D. Liveing, M.A., Professor of Chemistry, and J. Dewar, M.A., F.R.S., Jacksonian Professor, University of Cambridge. No. III.

In our last communication to the Royal Society we described certain absorption lines, which we had observed to be produced by the vapour of magnesium in the presence of hydrogen, and certain other lines which were observed when potassium, and others when sodium, was present, in addition to magnesium and hydrogen. These lines correspond to no known emission lines of those elements; but, inasmuch as they appeared to be regularly produced by the mixtures described, and not otherwise, we could only ascribe their origin to the mixtures as distinct from the separate elements. It became a question of interest, then, whether we could find the conditions under which the same mixtures would give luminous spectra, consisting of the lines which we had seen reversed. On observing sparks from an induction coil taken between magnesium points in an atmosphere of hydrogen, we soon found that a bright line regularly appeared, with a wave-

length about 5,210, in the same position as one of the most conspicuous of the dark lines we had observed to be produced by vapour of magnesium with hydrogen in our iron tubes. This line is best seen, *i.e.*, is most steady, when no Leyden jar is used, and the rheotome (the coil we used has an ordinary self-acting one) is screwed back, so that it will but just work. It may, however, be seen when the coil is in its ordinary state, and when a small Leyden jar is interposed; but it disappears (except in flashes) when a larger Leyden jar is used, if the hydrogen be at the atmospheric pressure. This line does not usually extend across the whole interval between the electrodes, and is sometimes only seen near the negative electrode. Its presence seems to depend on the temperature, as it is not seen continuously when a large Leyden jar is employed, until the pressure of the hydrogen and its resistance is very much reduced. When well-dried nitrogen or carbonic oxide is substituted for hydrogen, this line disappears entirely; but if any hydrogen or traces of moisture be present it comes out when the pressure is much reduced. In such cases the hydrogen lines C and F are always visible as well. Sometimes several fine lines appear on the more refrangible side of this line, between it and the *b* group, which give it the appearance of being a narrow band, shaded on that side. We have used various samples of magnesium as electrodes, and they all give the same results. We have also used hydrogen, prepared and purified in different ways: hydrogen prepared by the action of zinc on dilute sulphuric acid, purified by an acid solution of bichromate or permanganate, and by potash, and dried by sulphuric acid; electrolytic hydrogen; hydrogen from dry formate of soda and soda lime; hydrogen occluded by sodium and expelled by heat; and hydrogen occluded by palladium and expelled by heat. In the last two cases the whole apparatus was connected by fusion, and a Sprengel pump, also connected by fusion, employed to remove the air. In all cases the phenomena were the same.

In addition to the above-mentioned line, we observed that there is also produced a series of fine lines, commencing close to the most refrangible line of the *b* group, and extending with gradually diminishing intensity towards the blue. These lines are so fine and close to one another, that in a small spectroscope they appear like a broad shaded band. We have little doubt that the dark absorption line, with wave-length about 5,140, shading towards the blue, which we previously observed in our iron tubes, and described in our last communication, was a reversal of part of these lines, though the latter extend much further towards the blue than we had observed the absorption to extend. In fact, the bright lines extend somewhat more than half the distance between *b* and F, from forty-five to fifty being visible, and placed at nearly equal distances from each other. They also commence close to the *b* group, *i.e.*, with a wave-length nearly 5,164, but the first two or three lines at that end are not so bright as those which immediately succeed them. The light giving these lines does not extend to more than a short distance from the electrodes, and is generally most conspicuous at the negative electrode. There is a difficulty in consequence of the flickering character of the discharge in getting any accurate measures of them, though they are bright enough, especially at the less refrangible end, to be easily seen. The comparative faintness of the light from the iron tubes appears to us almost sufficient to account for our not having seen the reversed lines so completely as the bright ones; nevertheless, it is quite in accordance with what we in other cases observed, to suppose that some of these lines may be more easily reversed at the temperature of the iron tubes than others.

Zoological Society, June 18.—Arthur Grote, vice-president, in the chair.—The Secretary read extracts from a letter addressed to him by Mr. E. L. Layard, containing remarks on two species of New Caledonian birds.—A second communication from Mr. Layard stated that there was an example of the recently-described woolly cheetah (*Felis lanea*) in the South African Museum at Cape Town.—Mr. Edward R. Alston read a paper on the squirrels of the Neotropical region, in which he recognised twelve out of fifty-nine described species, and re-described two, *Sciurus rufoniger*, Pucheran, and *S. pusillus*, Geoffroy, which had been recently overlooked.—Mr. Slater exhibited and made remarks on a third collection of birds from Duke of York Island, New Britain, and New Ireland, which he had received from the Rev. George Brown, C.M.Z.S. Amongst them was an example of a new fruit-pigeon, proposed to be called *Carpophaga melanochroa*.—A communication was read from Dr. M. Watson, containing a description of the male

generative organs of *Chlamyphorus truncatus* and *Dasyptus sexcinctus*.—A communication was read from Prof. Garrod on certain points in the anatomy of Levaillant's darter (*Plotus levaillantii*).—A communication was read from Messrs. Garrod and Turner on the gravid uterus and placenta of *Hyomochus aquaticus*.—A communication was read from Mr. F. Moore containing the descriptions of New Asiatic butterflies of the family Hesperidae.—A second communication from Mr. Moore gave a list of the lepidopterous insects collected by the late Mr. R. Swinhoe, in the Island of Hainan.—A communication was read from the Marquis of Tweeddale, F.R.S., being the tenth of his contributions to the ornithology of the Philippines. The present paper gave an account of the collection made by Mr. A. H. Everett in the Island of Bohol. The collection contained representatives of forty-seven species. Although all of these were previously known, seven of them had not been before recorded as being inhabitants of the Philippines.—Dr. O. Finsch, C.M.Z.S., read the description of a new species of starling from Lake Marka-kul, in the Chinese High Altai, which he proposed to name *Sturnus pollaratzenskyi*, after Gen. Pollaratzensky, Governor of Semipalatinsk.—A communication was read from Mr. H. W. Bates containing the description of new species of coleopterous insects (*Geodephaga* and *Longicornia*) taken by the late Dr. Stoliczka during the Forsyth Expedition to Kashgar in 1873–1874.—A communication was read from Dr. G. Hartlaub, in which he gave the description of a new species of *Notanges* (*N. hildebrandti*) of Cabanis, M., discovered by Mr. Hildebrandt at Ikanga in Ukamba, Eastern Africa.—A communication was read from Lieut.-Col. R. H. Beddome, C.M.Z.S., giving the description of a new batrachian from Southern India belonging to the family *Phryniscidae*, which he proposed to call *Melanobatrachus indicus*.—Sir V. Brooke, Bart., exhibited and made remarks on a fine head of the male *Gazella granti*, originally described from sketches made by Capt. Speke during Speke and Grant's expedition. The present specimen had been shot by Mr. Arkwright about eighty miles from Ugogo in Eastern Africa.—A communication was read from Prof. v. V. Barboza du Bocage, F.M.Z.S., containing a list of the antelopes observed in Angola.—A communication was read from Mr. Carl Bock, in which he gave the description of two new species of shells from China and Japan.—A communication was read from Mr. Edgar A. Smith, containing the description of five new shells from the Island of Formosa and the Persian Gulf, with notes upon some known species.—Messrs. Godman and Salvin read the descriptions of some apparently new species of butterflies from New Ireland and New Britain, received from the Rev. G. Brown.—Mr. O. Salvin read the twelfth of a series of reports on the collection of birds made during the voyage of H.M.S. *Challenger*. The present paper contained an account of the Procellariidae, collected during the expedition. Eighty specimens had been obtained belonging to twenty-two species.—Mr. Slater read some supplementary notes on the curassows now or lately living in the Society's gardens.—Mr. J. Wood-Mason read a paper on the structure and development of the trachea in the Indian painted snipe (*Rhychnaea bengalensis*).

Physical Society, June 22.—Prof. G. C. Foster, vice-president, and afterwards Prof. W. G. Adams, president, in the chair.—The following candidate was elected a Member of the Society: Mr. F. W. Grieron.—Prof. W. G. Adams exhibited a new form of polariscope suitable for projecting on to a screen the figures formed by any crystal, and for measuring the angle between the optic axes. Parallel light from the electric lamp, after traversing a Nicol of about two-inch aperture, is rendered divergent by a set of lenses. The crystal under examination is placed in a recess formed by removing a slice from the middle of a spherical lens which is capable of motion in any direction about its centre, while any movement in the vertical plane passing through the axis of the instrument can be measured by a scale and Vernier; and if, by such a motion, the point on the screen representing the position of one axis, when the two are in the vertical plane, be transferred to that indicating the position initially occupied by the other axis, we have at once a measure of the optic angle of the crystal, for the rotation of two plano-spherical lenses forming an exact sphere has no effect on the direction of the beam.—Mr. Walter Baily read a paper on the effect of starch, salicine, unannealed glass, &c., on polarised light. In his experiments light was passed through a Nicol's prism, then through a quarter undulation plate, and then through a body having an optical structure symmetrical round

an axis in the direction of the ray, such as any of the above-named substances. The axes of the quarter undulation plate being taken as axes of reference, ρ being the angle between the plane of polarisation and one of these axes, σ half the difference of retardation at a given point between the part of the light resolved in a plane through the axis of the body and the part resolved perpendicular to that plane, ϕ being the angle between an axis of the $\frac{1}{4}$ -undulation plate and the perpendicular on the axis of the body from the given point (which perpendicular is taken as the initial line in the equation to the ellipse defining the light at such point) and r, θ , being the co-ordinates of this point, the writer finds the equation to the ellipse to be

$$1 + A \cos \theta + B \sin 2\theta = r^{-2} \{1 - (A^2 + B^2)\}$$

where $A = -\cos 2\rho \cos 2\phi$
and $B = \sin 2\rho \sin 2\sigma + \cos 2\rho \cos 2\sigma \sin 2\phi$.

From this equation diagrams have been drawn to exhibit the condition of the light at every point for different positions of the polariser. For the simple case of salicene or starch, in which the difference of retardation is the same, or nearly so, for all distances from the axis of the body, the diagram consists of a ring of ellipses of various eccentricities and inclinations, each ellipse showing the condition of the light along the radius on which it lies. For the general case in which the difference of retardation is a function of the distance from the axis of the body the diagram consists of two series of curves, one series being "isomorphical" curves or curves along which the eccentricity of the ellipse is constant, and the other series being "isoclinical," or curves along which the inclination of the axis major of the ellipse to the perpendicular in the axis of the body is constant. The general equation to the isomorphical lines is $A^2 + B^2 = \text{constant}$; and to the isoclinical lines is $\frac{A}{B} = \text{constant}$.

These two series of curves completely define the form and position of the ellipse of polarisation at every point and render it easy to determine what appearances will be presented on passing the light through an analysing prism in any given position. The results obtained were illustrated by some experiment.—Prof. W. C. Unwin made a communication on the flow from orifices at different temperatures. A paper recently appeared in *The Franklin Journal of Science*, by Mr. Isherwood, giving results of experiments on this subject, and according to him the volume discharged from a given orifice is increased by about 12 per cent. on raising the temperature from 60° to 212° . It is difficult to accept this result, because the friction is known to diminish the discharge by an amount much less than 12 per cent., and no other cause than a decrease of friction can be assigned to account for Mr. Isherwood's results. In the author's experiments the increase of discharge at 190° above that at 60° was only 4 per cent., with conoidal orifices in the form of the vena contracta; with thin edged orifices the variation of discharge was still less. He is disposed to think that the great increase of discharge in Mr. Isherwood's experiments was due to diminution of friction in a rather small pipe leading to the orifices, and would not occur with any other arrangement.

—Mr. Graham then read a paper on complementary colours. He stated that the three primaries are green, red, and blue, and not yellow, red, and blue; that yellow is a binary compound of green and red; and that yellow and blue when mixed form white. He remarked that after looking at a green disc the eye evokes another colour, but this is not seen unless certain conditions are fulfilled; thus the undulations must be arrested by a gray surface: this was proved by an experiment in which a green disc carrying a concentric ring half white and half black was caused to rotate, when a medium gray was produced and this at once arrested and made visible pink the complement of the green. Several other complementaries were shown by the same means. Mr. Graham next showed how the grays can be formed by cancelling either reflected or transmitted rays of white light. The first of these cases is illustrated by white paper painted over with a wash of Indian ink, and the second by the well-known Berlin tiles, in which light and shade are obtained by giving varying thickness to the ware. He showed that this last effect may be imitated by piling strips of paper to varying heights, and he has succeeded in photographing geometrical figures so formed. Lastly the author explained a method of arresting and showing the complementaries more satisfactorily than he considers has hitherto been done. Six thicknesses of white paper are gummed together and cut into a ring, a ring of the same size and shape being

also cut from a disc of coloured paper, and the white ring is let in to fill its place. On observing such a disc by white transmitted light the complement is seen through the ring.—Prof. S. P. Thompson exhibited a series of magnetic figures illustrating electro-dynamic relations. The lines of magnetic force around a wire carrying a magnetic current can be shown by passing a wire through a glass plate, strewing iron filings around, and tapping the plate gently. The filings may be fixed in their places, if the plate has previously been gummed and dried, by softening the gum with steam. Such a prepared plate may be used to project the figures of the magnetic curves in the lantern. Two parallel like currents attract, their curves forming a figure illustrative of the action; or they repel if travelling in opposite directions, the repulsion also being evident from the form of the curves. It was shown by a series of such lantern-slides that a very large number of electro-dynamic relations can be illustrated by curves produced in this manner. Figures were thrown upon the screen illustrating the law of oblique currents, the attraction of a magnet into or its repulsion out of a circuit, the deflection of a magnetic needle by a current, and the mutual tendency of a current and magnetic pole to rotate. A very curious figure was produced by a current running through a magnet longitudinally. A transverse section of the lines of force at a pole gave neither the radial lines of the magnet nor the circular lines of the current, but a series of spirals. It was argued that Faraday's conception of the lines of force tending to shorten themselves supplied the means of interpreting the physical effects indicated by the lines of force in the various figures.—The Secretary read a paper by Mr. C. H. Hinton, on the co-ordination of space. If a cubical space be divided into twenty-seven numbered cubes, and each of these be again subdivided in the same way, and so on, the position of any point within the initial cube can be expressed by a reference to the numbers of the several cubes in which it is placed, and the more this series of numbers is extended, the more accurately is its position defined; and, further, if we consider an expression of the form $\dots r q p o n m . l k j i h \dots$ where each letter stands for any number from 1 to 27, and if m , before the dot, indicates the unit space, it will be evident that by such an expression the position of any point in space can be indicated with any degree of accuracy; each letter representing a space twenty-seven times as great as that which immediately succeeds it; or, in place of 27, any other number offering special facilities for any given purpose may be employed. The author then gives some account of the manner in which the system can be utilised for classifying chemical phenomena and in arranging plants, &c.—An adaptation of the telephone and microphone for communicating vibrations to the phoneidoscope, by Mr. Tisley, was then shown. The metal disc carrying the soap film is fixed just above the telephone plate, and, this being in circuit with a microphone and battery, any vibration imparted to the microphone at once sets the soap film in action, the characteristic figures being at once obtained.—Mr. A. Haddon exhibited a modified form of microphone which he has arranged with a view to make the same instrument available for receiving sounds of any given intensity. Its main peculiarity consists in having a thin strip of elastic attached to the middle of the pointed graphite. By varying the tension of this elastic, the sensitiveness of the instrument can be accurately regulated.—The meeting of the Society was then adjourned to November.

Chemical Society, June 20.—Dr. Gladstone, president, in the chair.—The following papers were read:—Contributions to the history of the naphthalene series, No. 2, β naphthaquinone, by Dr. Stenhouse and Mr. Groves. By the action of nitric acid sp. gr. 1.2 on this substance, mononitro- β -naphthaquinone was obtained in red crystals. By the action of dilute sulphuric acid a dark-coloured compound was obtained, which, on reduction, yielded white acicular crystals, and on oxidation orange-coloured prisms. The new quinone has the formula $C_{20}H_{10}O_4$; the authors purpose to call it dinaphthylidquinone. It is very stable.—On pyrotritaric and carbopyrotritaric acids, by Mr. G. Harrow. By saponifying diacetosuccinic ether with dilute sulphuric acid, the author succeeded in preparing these two acids; the author has obtained sodium and silver salts, and discusses their constitution.—Laboratory notes, by Dr. Armstrong.—On the action of alkaline hypobromite on ammonium salts, urea, and oxamide, Prof. W. Foster. The author gives a *résumé* of the present state of our knowledge as to the action of hypobromite on ammonium salts and urea, with some results of his

own; he then investigates the action of hypobromite on oxamide—74·87 per cent. of its total nitrogen is given off—and endeavours to ascertain the precise condition of the suppressed nitrogen.—Action of the halogens at high temperatures on metallic oxides, by Messrs. C. F. Cross and S. Suguiwa. With lead oxides oxyiodides are formed, and with the oxides and carbonates of the alkaline earth metals in the presence of oxygen periodates are produced.—On manganese tetrachloride, by Mr. W. W. Fisher. The author has studied the action of strong hydrochloric acid on the black and red oxides of manganese; brown liquids are formed containing a highly chlorinated manganese compound, probably the tetrachloride, which is readily resolved into manganous chloride and free chlorine.—On salts of nitrous oxide, by Mr. A. E. Menke. The sodium salt was obtained by fusing nitrate of soda with iron filings; its properties and reactions were studied. Diver's silver salt was prepared, and its composition confirmed.—Notes on madder colouring matters, by Messrs. E. Schunck and H. Roemer. The authors have prepared some quantity of munjistin and examined its properties, also its reactions with acetic anhydride, bromine, potash, and nitric acid. In all respects munjistin resembles purpuroranthic acid.—On the occlusion of hydrogen by copper, by Mr. G. S. Johnson. The discrepancy between the results obtained by previous experimenters is explained (1) by the fact that hydrogenised copper retains nearly all its hydrogen in vacuo at a red heat. (2) That the same metal occludes varying quantities of hydrogen. The amount occluded is in most cases sufficient to introduce a serious error in organic analysis. At a red heat copper oxide occludes carbonic acid.—On the rôle played by carbon in reducing the sulphates of the alkalis, by Mr. J. Maclear. At a high temperature with excess of carbon, sodium sulphide and carbonic oxide are formed. At a dull red heat sodium carbonate and carbonic acid are produced in addition.—On the action of ethylchlorocarbonate on some oxygenated haloid compounds of the fatty series, by Mr. O'Neil F. Kelly. The compounds employed were allyl alcohol dibromide glycerindichlorhydrin and epichlorhydrin.—The Society adjourned over the recess.

PARIS

Academy of Sciences, July 8.—M. Fizeau in the chair.—The following among other papers were read:—Action of heat on aldol, by M. Wurtz. He obtains, beside crotonic aldehyde, a little ordinary aldehyde, and, in certain circumstances, a new polymer of the aldehyde, which he describes.—On malignant pustule in fowls, by MM. Pasteur, Joubert, and Chamberland. Fowls when cooled contract it easily, and they may then be completely cured by reheating.—Influence of atmospheric electricity on the nutrition of plants, by M. Grandean. His mode of experiment was to place two plants of the same species (tobacco, maize, wheat) under the same conditions as to soil, aëration, isolation, &c., but the one withdrawn from the action of atmospheric electricity by means of a Faraday's cage. The plants thus withdrawn elaborated, in equal times, 50 to 60 per cent. less of living matters than the others. Plants of small elevation above the ground are also affected by atmospheric electricity. The centesimal amount of proteic matter formed appears not to depend sensibly on this action; it is proportional to the yield. The proportion of ash is higher in plants removed from the electricity; and the proportion of water is less.—On the curves of solubility of salicylic and benzoic acids, by M. Bourgoin. Taking the temperatures for abscissæ, and the quantities dissolved for ordinates, the solubility of salicylic acid in water is represented by a parabolic curve, whose convexity is towards the axis of temperatures.—On the diffusion of fire-damp in mines, by M. Coquillion. The experiments show that it diffuses very slowly from above, but rapidly upwards.—On a disease of malignant pustule form, caused by a new aerobic vibron, by M. Toussaint. He found this vibron in a rabbit inoculated from the blood of a horse which had died rapidly with symptoms of malignant pustule.—On *Avenardia Prietii*, a giant Nemertean of the west coast of France, by M. Giard. In the state of rest it measures 1 m. to 1·20 m. in length (in extension twice or thrice as long), the width being 2 to 3 cm. It is found in hundreds in an old canal from salt marshes at Poulguen, now transformed into a reservoir, where the seawater is renewed each tide.—Observations and experiments on the migrations of *Filaria rhytipleuris*, a parasite of cockroaches and rats, by M. Galet. The eggs produced by the parasite in the alimentary canal of the rat are thrown out with

fecal matters, and swallowed by the cockroach. The embryos, when hatched, penetrate the walls of the alimentary canal of the latter, and are encysted in fatty matter, where they await the cockroach being devoured by the rat. In the rat they now complete their cycle.—Experimental researches on the variations of volume of the cranium, and on the applications of the graphic method to solution of various anthropological problems, by M. Le Bon. A superior race contains more of voluminous crania than an inferior. Among 100 modern Parisian heads there are about eleven with a cranium of 1,700 to 1,900 cubic centimetres; in the same number of negro heads not one is be found of such size. The weight of 100 masculine Parisian brains of the present varies between 1,000 and 1,700 grammes, the volume between 1,300 and 1,900 cubic centimetres. The difference between the largest and smallest brains among modern Parisians is three times that observed in the negro, and it is greater than in the Parisians' ancestors of 600 years ago. Stature has only a very slight influence on the volume of the brain. With equal stature woman has a much less heavy brain than man. Rising in the scale of civilisation, the difference in weight of brain (and so volume of cranium) between man and woman is found constantly increasing; thus the average difference of crania of the present Parisian men and women is nearly double that between the crania of the ancient Egyptian men and women. Persons having the same circumference of crania may have differences in volume of over 200 cubic centimetres; but operating on series, 1 centimetre increase of circumference corresponds to an increase of about 100 cubic centimetres in volume. Certain relations are found to exist between circumference of cranium and head, and volume and weight of brain. The cranium is always unequally developed on the two sides, without apparent relation to race or intelligence.—Automatic imitation of mountain chains on a globe according to the theory of upheaval, by M. Chancourtois. This is by the method of a caoutchouc balloon covered with wax, then allowed to contract.—Determination of the orbit of the planet 103, Hera, by M. Leveau.—On the development of the cephalo-thoracic portion of the embryo of vertebrates, by M. Cadiat.

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ERRATA.—Vol. xviii. p. 294, 2nd column, line 22 from top, read for "insolvents" "resolvents;" line 31, for "2m" read "2m." In last week's "Paris," parenthesis near beginning, for "distillation (which discoloured the fatty acids)" read "distillation (which had been resorted to to purify the fatty acids)."